

## AN AMMONITE FROM THE UPPER CRETACEOUS OF VICTORIA

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### Abstract

An occurrence of the ammonite *Hauericeras angustum* Yabe in a core from a bore between Warrnambool and Port Campbell on the coast of W. Victoria is described. A Lower Senonian age is indicated.

### Description and Discussion

A core (No. 16) from Flaxmans No. 1 Well, depth 5958-5961 ft, containing an ammonite was received from Frome-Broken Hill Co. Pty Ltd in June 1961. The location of the bore, which was situated on the coast of W. Victoria between Warrnambool and Port Campbell, the section penetrated, and the foraminifera found in it are described by Taylor (1964). The core was taken from the lower part of the Belfast Mudstone. Kenley (1958-9) had previously reported occurrences of Ammonoidea in the Belfast Mudstone of the Belfast No. 4 Bore, Port Fairy, but because of crushing and incompleteness of the shells he could only refer one to the Placenticeratidae while the other was said to have closest relationships with the Acanthoceratidae.

The specimen from Flaxmans No. 1 Well (Pl. LXXV; Fig. 1, 2) was found in a hard, dark grey, splintery claystone. The periphery of the core has cut off about  $\frac{2}{3}$  of the ammonite, just missing the protoconch. The conch is flattened and not filled with sediment, the lower side being pressed against the inner surface of the upper side. The shell is brittle, dark brown, and partly nacreous. The greatest measurable distance from the protoconch to the periphery is 36.8 mm, the maximum measurable whorl height is 25.5 mm.

The fossil can be assigned to *Hauericeras angustum* Yabe 1904. This species was recently revised by Matsumoto and Obata (1955, p. 137) and placed in a new subgenus *Gardeniceras* which was apparently not accepted as such by Arkell, Kummel, and Wright (1957, p. L 371). The genus *Hauericeras* has, according to Matsumoto and Obata (1955, p. 133), the following diagnostic characters which are recognizable in the present specimen: 'Very compressed, discoidal and polygyral shell, with a . . . keeled venter and subangular umbilical shoulder in more or less later growth stages. . . . Surface of the shell is nearly smooth or very faintly ornamented with the striae and/or riblets which are flexiradiate on the flanks and show a prominent projection on the venter . . .'. The subgenus *Gardeniceras* (type species *Ammonites gardeni* Baily 1855) was proposed for the 'Fairly evolute and fairly widely umbilicate subgroup of *Hauericeras*. . .' (Matsumoto and Obata 1955, p. 134). The species *angustum* Yabe was diagnosed as follows: 'Discoidal, evolute, polygyral shell of moderate size, usually about 150 mm and occasionally over 170 mm when full-grown, consisting of much compressed whorls, keeled in the later stages, rather flattened on flanks and gently convergent in section, with the maximum breadth near the umbilical margin. The umbilicus is fairly wide and is surrounded by a steep but low wall and subangular shoulder. Surface of the shell is nearly smooth, with only faint, irregular fine riblets or striae, which are better developed on the inner half of the flanks and weakened towards the venter showing



FIG. 1—*Hauericeras angustum* Yabe. Outline of fragment from the Cretaceous of Victoria (with umbilical shoulder shown by broken line) reconstructed by superimposition on a specimen from Hokkaido (Matsumoto and Obata 1955, Pl. 29, fig. 1a, reversed), to show identical coiling. The umbilical shoulder of the distal part of the Japanese specimen is missing. About  $\frac{1}{2}$  nat. size.

FIG. 2—*Hauericeras angustum* Yabe. Outline of the distal profile of the shell of the body chamber as preserved (partial whorl section at whorl height about 25 mm, showing ventral keel and umbilical shoulders). Cretaceous of Victoria. About  $\frac{1}{6}$  nat. size.

gentle flexuosity on the sides and prominent projection on the venter. Constrictions are very faint or hardly discernible in the inner whorls and occasionally better marked but infrequent on the outer whorl. They run nearly parallel to the striae, with only slight flexuosity on the sides. . . . (Matsumoto and Obata 1955, p. 139). In these quotations, the characters of the very young and very old stages have been omitted, also all references to the suture line which is not preserved in the present specimen. Although this may be considered to make a positive identification hazardous, there are sufficiently distinctive characters of shell form and sculpture clearly in full agreement with the diagnosis. In addition, the ventral keel is as described by Matsumoto and Obata for shells of the size of the Victorian specimen, i.e. indistinct on the inner but distinct on the outer surface of the shell.

The question whether the distinction between *H. angustum* Yabe 1904 from Japan, India, and Canada and *H. gardeni* Bailly 1855 from Africa and Madagascar is justified, was discussed at length by the Japanese authors. Their conclusion is that the two species are closely allied but specifically separated, a distinction which can apparently be made only when numerous specimens showing various growth stages are available. The main distinctions are seen in the constrictions which, however, are indistinct in individuals below 80 mm diameter, and in the ratio of whorl width and height. In the present specimen one half of the shell of the best preserved whorl is unbroken and uncompressed so that its width can be estimated (Fig. 2). On the

basis of the published comparative diagram (Matsumoto and Obata 1955, Fig. 11), it is closer to the position for *H. angustum* than to that for *H. gardeni* for a whorl height of 25 mm. Whether the suggested taxonomic distinction indicates a species or a subspecies difference cannot be decided without a detailed comparative study of a large amount of material. The question of a possible existence of geographic subspecies has to be approached with care, as the time range of *H. angustum* and *H. gardeni* in various areas is relatively long and possible intraspecific evolutionary changes have to be considered.

AGE: The genus *Hauericeras* ranges from Coniacian to Maestrichtian (Arkell, Kummel, and Wright 1957). It is thought to have evolved either in the Coniacian from *Tragodesmoceras* or, at the beginning of the Turonian from the Desmocerotinae close to the origin of the family Munciceratidae to which *Tragodesmoceras* is now assigned (Arkell, Kummel, and Wright 1957). *H. angustum* is reported doubtfully from the Coniacian and occurs occasionally in the Lower Campanian and fairly commonly in the Santonian of Hokkaido and South Saghalien (about 42-53°N.). It occurs also in the Upper Cretaceous of South India and British Columbia. Matsumoto (1959, Pl. 8) showed the range of this species as Coniacian (upper) to Campanian (lower) and said (p. 70) that it is rather abundant in the zone of *Inoceramus naumanni* (placed in Santonian-Lower Campanian) 'but ranges somewhat upward and probably also downward'. He expressed the opinion that species of *Hauericeras* cannot define a narrow zone. The age of *H. gardeni* as restricted by the Japanese authors is apparently Santonian to Campanian.

The evidence from foraminifera indicates Turonian to Lower Senonian (including Coniacian and possibly Santonian) age of the Belfast Mudstone. *Hauericeras* was found in the lower part of the Belfast Mudstone, above Taylor's Zonule B and in the lower part of his Zonule A. It is noted that *Hauericeras* is not known from the Turonian. A Lower Senonian, possibly Coniacian, age of the specimen from Victoria is consistent with macrofaunal and foraminiferal evidence.

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#### Explanation of Plate

##### PLATE LXXV

*Hauericeras angustum* Yabe. From Flaxmans No. 1 Bore, W. Victoria, 5958-5961 ft. A preserved portion of the ventral keel is outlined in black (top). The outline of part of the bore core is indicated by a broken line. X 2. Photo Dr Mary Wade, University of Adelaide. National Museum of Victoria Reg. No. P22888.